Annex 16:

Requirements on Validation of Advanced Capital Measurement Approaches

1. General Requirements

Commercial banks adopting the internal ratings-based approach, internal models approach, and advanced approach for credit risk, market risk and operational risk respectively shall establish the validation system as per requirements of this Annex to continuously review the advanced capital measurement approaches and their supporting systems, improve self-correction mechanisms, and make sure the capital fully reflects risks.

As for capital quantification models and supporting systems that are already in use before the Rules become effective, commercial banks shall, as per requirements hereof, carry out assessment of the overall pre-adoption validation, supplement relevant documents, and demonstrate that the regular monitoring and comprehensive post-adoption validation have met the requirements hereof on overall pre-adoption validation.

The CBRC shall regularly assess commercial banks’ validation and internal auditing relating to validations. Should the validations and auditing be insufficient, deficient, or failing to meet supervisory requirements, the CBRC has the right to require the banks in questions to perform further validation or auditing.

1.1 Scope and goals of validation

1.1.1 Commercial banks shall be primarily responsible for validation of their advanced capital measurement approaches and achieve the following goals by setting up sound validation system:

1.1.1.1 To make the advanced capital measurement approaches more robust and reliable;

1.1.1.2 To establish self-correction mechanism, enhance the risk
prediction capability of advanced capital measurement approaches, and promote continuous improvement of approaches and systems; and

1.1.1.3 To allow the senior management and related employees to better understand the quantification models, be fully aware of the models’ limitations, improve the use of results from these models, and thus ensure capital accurately reflects risk level.

1.1.2 Validation of advanced capital measurement approaches includes validation of quantification models and supporting systems.

1.1.3 When validating the quantification models, commercial banks shall focus on reviewing sample data used for model development, modeling methodologies, major assumptions and parameters, model development process and use of model results. They shall validate independently in-house developed models and models bought from third parties and make sure the models are fit for their actual asset portfolios and risk profile.

1.1.4 When commercial banks validate the supporting systems, the scope shall cover but not limit to policy and processes related to quantification model use, data, information system, model application and user feedback, as well as relevant documents and records, etc.

1.1.5 Commercial banks shall use quantitative and qualitative validation approaches at the same time. Quantitative validation includes validation of model accuracy, discriminative ability and stability by using back testing, benchmark testing and mathematical and statistical tools, while qualitative validation, by expert judgments, focus on the governance structure, policies, processes, controls, document management and use of model results concerning the quantification models and supporting systems.

1.1.6 The validation shall focus on the performance and use of model results in business departments, and the validation results and other feedback information shall be provided to the senior management and model users in a timely manner so as to facilitate continuous improvement of quantification models and supporting systems and promote in-depth application of model results.
1.2 Validation stages

1.2.1 The validation is a continuous and repetitive process. It can be divided into three stages, namely comprehensive validation prior to the adoption (hereinafter referred to as “comprehensive pre-adoption validation”), regular continuous monitoring, and comprehensive validation after the adoption (hereinafter referred to as “comprehensive post-adoption validation”). The validation results from one stage shall be regarded as important basis for the next stage and improvement of advanced capital measurement approaches.

1.2.2 Prior to the adoption of quantification models and supporting systems, commercial banks shall carry out comprehensive pre-adoption validation. The validation shall include validation of quantification model development, particularly the rational and reasonableness of quantification model approaches, compliance and operability of key definitions, integrity of data, as well as effectiveness of risk quantification. The validation shall also cover models, relevant policies, processes, data, information systems, documents and records, etc, so as to ensure overall assessment of the robustness, reliability and compliance of the quantification models and supporting systems.

1.2.3 Commercial banks shall perform regular continuous monitoring of the advanced capital measurement approaches, so as to understand the performance of quantification models, analyze the impact of changes in operating environment or assumptions on the model results, and monitor the operation of supporting systems.

1.2.4 Commercial banks shall conduct comprehensive review and test on the quantification models and supporting systems already in use and produce comprehensive assessment results that are used as basis for the improvement of advanced capital measurement approaches. The banks shall determine the frequency of overall validation according to the different characteristics of advanced capital measurement approaches.

1.3 Validation governance structure
1.3.1 Commercial banks shall have in place well-established validation governance structure to ensure sustainable, effective and independent validation and provide basis for continuous improvement of advanced capital measurement approaches.

1.3.2 Commercial banks shall have in place validation policy approved by the board of directors or the committee(s) authorized by the Board, to ensure the validation is standardized, independent, and effectively integrated into risk measurement and management system. The validation policy shall at least:

1.3.2.1 Clearly define the roles and responsibilities of the board of directors and the committee(s) authorized by the Board, senior management, department in charge of validation, auditing department, business departments, model development team and various validation functions in the course of validation, and make it clear that conformance of validation results to pre-defined criteria is a prerequisite of getting internal approval for advanced capital measurement approaches;

1.3.2.2 Define the scope and basic methods for the validation of advanced capital measurement approaches, and set up the mechanisms concerning regular assessment and updating of validation tools and methods;

1.3.2.3 Define the principles for determining the functions and owners of comprehensive pre-adoption validation, regular continuous monitoring and comprehensive post-adoption validation, so as to ensure validation is independent and objective.

1.3.2.4 Define the policies for managing the processes of comprehensive pre-adoption validation, regular continuous monitoring and comprehensive post-adoption validation, as well as policy for the use of validation results, and ensure correction self-mechanism is established and the quantification models and supporting systems are continuously improved.

1.3.2.5 Define the requirements on validation reporting system to
make sure reported information and reporting frequency meet the provisions of this Annex and the needs of internal risk management; the reporting system shall, in light of differences in validation types, frequency, importance and purpose of reports, clearly define the elements, formats, intended audience, contents, level of detail, frequency and approval authority of various validation reports; and

1.3.2.6 Establish and continuously improve documentation management requirements, and make sure the validation process can be tested and replicated independently by a third party.

1.3.3 The board of directors and the committee(s) authorized by the Board shall perform the following the responsibilities:

1.3.3.1 To have a general understanding of the framework and characteristics of the bank’s advanced capital measurement approaches;

1.3.3.2 To approve or delegate authority for approving validation-related policies and listen to briefings on the implementation of validation policies once a year;

1.3.3.3 To monitor senior management to set up and improve validation policies and execution mechanism so as to make sure that the bank has sufficient resources for independent and effective validation; and

1.3.3.4 To make sure the internal auditing department adopts systematic, standardized methods to oversee the validation process in an independent and objective manner.

1.3.4 The senior management shall perform the following responsibilities:

1.3.4.1 To understand in depth the framework and features of the advanced capital measurement approaches adopted by the bank and understand main risk factors that affect the quantification models;

1.3.4.2 To organize the development of the validation-related
policies, establish and improve validation policies and processes, and ensure that validation continuously play its part in reasonable use of model results and improvement of advanced capital measurement approaches;

1.3.4.3 To organize the work of validation, determine the owner(s) of validation at different stages, define the roles and responsibilities of model developer, model users and data providers, and allocate sufficient human resources and IT resources, so as to ensure the independence of validation;

1.3.4.4 To regularly listen to detailed report on validation, assess whether the validation methodologies, tools and internally-defined criteria are reasonable and effective, listen to the briefing on regular continuous monitoring and comprehensive post-adoptions validation at least once a year, and listen to the report on comprehensive pre-adoptions validation before the launch of new quantification models; and

1.3.4.5 To clearly understand the impact of deficiencies of existing advanced capital measurement approaches on risk measurement, business activities and capital adequacy, be responsible for approving major modifications or re-development proposals, and report the modifications of advanced capital measurement approaches to the board of directors and the committee(s) authorized by the Board.

1.3.5 A commercial bank shall appoint a department to take charge of validation work. Said department shall be responsible for validating advanced capital measurement approaches, and organize the validation of advanced capital measurement approaches at different levels of the bank. Said department shall perform the following responsibilities:

1.3.5.1 To organize the implementation of validation policies, develop working framework and theoretical methodology for validation, and standardize the validation processes;

1.3.5.2 To organize and carry out overall validation, and be responsible for comprehensive pre-adoptions and post-adoptions
validations of capital measurement approaches for material risks;

1.3.5.3 To coordinate the validation of advanced risk measurement approach and determine the owner(s) of validation at different stages;

1.3.5.4 To prepare validation report, and make sure the board of directors and the committee(s) authorized by the Board, senior management and model users understand the information about the validation of advanced capital measurement approaches at the group level and other levels, as well as main validation results and recommendations for improvement; and

1.3.5.5 To provide feedbacks about the validation to the model developers, policy makers and model users, and propose recommendations for improvement.

1.3.6 The model developer(s) shall provide documents with regard to modeling data sample, modeling methodologies, major assumptions, modeling process, instructions to users, and model limitations needed for validation, and conduct trial operation testing of model as well.

1.3.7 Commercial banks shall designate different owners of validation to meet relevant validation needs. They shall:

1.3.7.1 Designate an owner of model validation with the responsibility of conducting comprehensive pre-adoption and post-adoption validation of quantification models;

1.3.7.2 Designate an owner of risk monitoring with the responsibility of monitoring quantification models’ daily operation and developing monitoring analysis reports; and

1.3.7.3 Designate an owner of supporting systems validation with the responsibility of validating the supporting systems and developing validation reports.

1.3.8 The role and responsibilities of validation owners shall be defined so that they meet the requirements of independence. The owner of
comprehensive pre-adoption and post-adoption validation shall be independent of model developer(s) and model user(s), and the regular continuous monitoring shall be independent of model user(s). The owner of validation should not directly benefit from the business activities of model user(s).

1.3.9 The internal auditing department of a commercial bank shall oversee the validation of advanced capital measurement approaches adopted by the bank, assess the fitness, independence and effectiveness of its validation policies, governance structure, processes and procedures, key implementation aspects and reporting mechanisms, and make sure the bank can independently and impartially review and validate the models and supporting systems.

1.3.9.1 Internal auditing surrounding validation shall be conducted at least once a year. It shall cover the entire process of validation. The internal auditing department shall timely provide issues and problems identified to senior management and regularly give briefings on auditing results to the board of directors and the committee(s) authorized by the Board;

1.3.9.2 Where the internal auditing department identifies major weaknesses, it shall report relevant information to the CBRC; and

1.3.9.3 Internal auditors shall have necessary knowledge and skills, and be familiar with the validation policies, processes and methods.

1.4 Validation processes and methods

1.4.1 Commercial banks shall have in place procedures for pre-adoption validation, continuous monitoring and post-adoption validation, clearly define the scope and contents of validation, choose appropriate methods, develop detailed operation procedures, and properly arrange the order and frequency of various activities, so as to ensure the validation is carried out as planned.

1.4.2 Commercial banks’ validation processes shall include trigger mechanism so as to make sure the validation process can timely initiated
to capture the changes in quantification model performance and supporting systems.

1.4.3 Commercial banks’ validation processes shall include response mechanism so as to make sure that when material adjustments occur due to significant changes in the validated objects or validation conditions, changes in validation can be timely recorded and checked; in addition, change-responding plans shall also be developed so as to ensure that changes will not hinder the validation process.

1.4.4 Commercial banks shall fully understand the risk characteristics of asset portfolios and characteristics of advanced capital measurement approaches, design validation tools and methods tailored to risks associated with different asset portfolios, and make sure the techniques for validation effectively meet the purpose of validation.

1.4.5 Staffs involved validation process shall fully understand the limitations of different model approaches and focus the validation on important aspects according to the characteristics of measurement approaches.

1.4.6 Commercial banks shall have in place automatic monitoring system to make sure the consistency of standards and procedures applied in regular continuous monitoring.

1.4.7 Commercial banks shall document the entire validation process. The document shall at least cover the scope, contents, methods, steps and results of validation, validation report, identified deficiencies, correction measures and assessment of improvements, etc.

1.5 Supporting systems

1.5.1 Commercial banks shall establish a set of complete validation data management processes to ensure that validation is conducted on the basis of accurate, appropriate and complete data.

1.5.2 Commercial banks shall have in place information systems that are capable of effectively supporting the validation, improve the level of
automation in validation, and increase the efficiency and accuracy of validation; the requirements on the development of information systems and internal controls shall comply with appropriate regulations of the CBRC.

1.5.3 Validation data management processes shall include the following aspects:

1.5.3.1 To establish validation-supporting dataset that is capable of screening data, verifying logic, and reconciling back-office data from different sources so as to ensure the accuracy of data used for validation. If validation sample dataset is needed, sampling criteria shall be defined;

1.5.3.2 To develop rules for data storage to ensure the safety of long-term data storage and meet the requirements on data observation period for validation purpose;

1.5.3.3 To develop rules on manual entry of data and provide necessary training for data entry staffs, so as to reduce the manual data entry errors; and

1.5.3.4 To regularly assess the quality of validation data.

1.5.4 Commercial banks shall store various important documents relating to validation, record in a detailed manner all contents of validation, and make sure the validation can be checked and replicated. Such documents shall include:

1.5.4.1 Technical documents relating to the development of advanced measurement approaches;

1.5.4.2 Analysis documents and reports concerning various stages of validation;

1.5.4.3 The basis for the development of policies and processes and the impact on relevant risk measurement;
1.5.4.4 Records of self-correction measures taken in light of the validation results;

1.5.4.5 Briefing documents presented to the board of directors or senior management;

1.5.4.6 Internal auditing reports; and

1.5.4.7 Other documents that help third parties to understand the compliance of validation.

2. Validation of internal rating system for credit risk

2.1 Basic Requirements

2.1.1 The validation of internal rating system for credit risk shall assess the accuracy of internal rating and risk parameter quantification, including whether:

2.1.1.1 Non-retail risk exposures are rated and retail risk exposures are segmented to asset pools pursuant to pre-designed requirements;

2.1.1.2 Internal ratings can effectively differentiate risks;

2.1.1.3 Migration of non-retail risk exposure ratings conforms to corresponding rating methodology;

2.1.1.4 The system for pool segmentation of retail risk exposures can accurately assign risk exposures to appropriate asset pools; and

2.1.1.5 The actual default rate, severity of loss and risk exposure of each rating level or asset pool are consistent with estimated risk parameters.

2.1.2 The validation of internal rating system shall assess the stability of the internal rating and risk parameter quantification, that is, when risks remain unchanged, the adopted policies and criteria can make the ratings and estimated risk parameters unchanged on the whole, but it
does not mean no adjustments may be made to the rating system.

2.1.3 The validation of internal rating system shall assess the robustness of the internal rating and risk parameter quantification, that is, the adopted policies and criteria can identify the degree of uncertainty of the data sources for internal rating, pool segmentations and quantitative estimation and conservativeness of the internal ratings and risk parameter quantification, so as to make sure actual results do not significantly exceed the estimated risk parameters.

2.1.4 The frequency of internal rating system validation shall ensure that both internal ratings and risk parameter quantification are accurate, complete and reliable. When there are material changes in the methods, data or implementation of both internal rating and risk parameter quantification, the commercial bank in question shall timely carry out relevant validation activities.

2.1.5 The internal rating system validation shall include 3 stages, i.e. comprehensive pre-adoption validation, regular continuous monitoring and post-adoption validation.

If a commercial bank does not have sufficient data for result analysis when it starts to adopt the IRB approach, it shall use a number of means, such as validation of development evidence, process verification, and benchmark testing, etc, to ensure internal rating results and risk parameter estimates are correct. Early-stage validation activities shall include the senior managements’ judgments on the effectiveness of rating system operation, other than depending on empirical analysis only.

2.1.6 Commercial banks shall conduct comprehensive pre-adoption validation on the internal rating system to ensure basic conditions have been met for the adoption of internal rating-based models and the internal rating system meet the minimum requirements set forth in Annex 5.

2.1.7 The comprehensive pre-adoption validation report shall be used as basis for approving the adoption of the internal rating system and
the validation results shall be used as basis for setting threshold values for continuous monitoring indicators.

2.1.8 Commercial banks shall conduct regular continuous monitoring on the internal rating system and assess the performance of quantification models and rating system through a range of monitoring indicators, so as to ensure the rating system is applied reasonably and quantification models’ risk differentiation and calibration and stability meet internally specified criteria.

2.1.9 Where monitoring indicators exceed threshold values, the commercial bank in question shall initiate comprehensive post-adoption validation where appropriate.

2.1.10 Commercial banks shall carry out comprehensive post-adoption validation on the internal rating system in conjunction with annual review on the effectiveness of the rating system, so as to provide basis for continuous application of the internal rating system or overall optimization thereof. Where material changes happen to the bank’s asset portfolio, credit granting policy and processes, or significant changes happen to economic cycle and/or other external factors, commercial banks shall timely initiate overall validation.

2.1.11 Commercial banks shall, in light of the characteristics of the internal rating system and risk quantification model, use at least two methods to validate the model’s risk differentiation capability and stability, as well as the accuracy of risk quantification. Staffs involved in validation processes shall, given their understanding of the model’s logic and limitations, be able to explain why they choose the validation methods and how suitable they are, and understand the limitations of these methods.

2.1.12 Commercial banks shall assess the difference between current rating system and other rating results through benchmark testing. They shall choose reasonable benchmarks according to features of risk quantification models and rating system, and conduct benchmark testing on model results and rating results respectively. For banks using external rating results to support the validation and calibration,
they shall understand the risk factors and rating criteria considered under external rating and make sure external rating structure is consistent with internal ratings.

2.1.13 Commercial banks adopting foundation internal rating-based approach can compare actual loss given default and exposure at default against supervisory requirements. The LGD and EAD shall become important factors in internal economic capital assessment.

2.2 Comprehensive pre-adoptive validation

2.2.1 Comprehensive pre-adoptive validation shall include but not limit to the following activities:

2.2.1.1 To validate the development stages of risk quantification model and other rating-related models, namely data selection, parameter estimation, mapping and parameter application for risk quantification, including the policy, processes, key definitions, modeling data and underlying assumptions, and methodologies concerning risk parameter quantification; and

2.2.1.2 To validate the rating governance structure, rating system design, rating processes, and information system and data management in support of internal rating.

2.2.2 Commercial banks shall assess the development evidences for internal rating and risk quantification models. The development evidences are the foundation for the design and set-up of internal rating system and risk quantification. It includes research literature, empirical foundation, and technical logic for statistical models that can demonstrate the reasonableness of chosen methods and selected variables. Assessment of development evidence shall meet the following requirements:

2.2.2.1 The internal rating system can accurately assess the obligator risks and facility risks;

2.2.2.2 The pool segmentation system can accurately measure risk profile of different asset pools and measure the changes of risk pools
over time; and

2.2.2.3 The risk parameter quantification can accurately estimate the PD, loss given default, and exposure at default.

2.2.3 Where there are material changes in the internal rating system or risk parameter quantification model, the commercial banks shall reassess the development evidences.

2.2.4 Comprehensive pre-adoption validation shall include comparing the strengths and weaknesses of current internal rating system & risk parameter quantification methods and other alternatives. As for retail asset portfolio, the assessment of development evidences shall include conducting comparative analysis and selection of different risk-driving factors by using empirical experiences.

2.2.5 For commercial banks adopting models-based internal rating system, the validation shall include analyzing the quality of models-supporting data and statistical modeling techniques; analyzing historical experience data of the rating system operation to ensure maximum match between the results and development samples; and validating the adaptability of statistical models by means of out-of-time-period and out-of-sample data testing.

2.2.6 For commercial banks adopting expert judgment-based rating system, the validation can include checking the basis on which the rating system accepts expert experiences and assessing the ultimate performance of the models.

2.2.7 For commercial banks adopting expert judgment-based rating system and using model estimates as inputs, the validation shall check the threshold value of selected financial ratios or system of scoring model, including logical and empirical descriptions of historical default and loss ratios or scores.

2.2.8 Commercial banks shall set up representative data sample to conduct benchmark testing on the internal rating system, that is, to arrive at conclusions using alternative methods or data and then assess whether the
internal rating results and risk parameter estimates are reliable. The benchmark testing shall check the difference between the conclusions derived from current rating approach and other rating approaches; as for retail risk exposure, the benchmark testing shall check whether other pool segmentation approaches can produce similar risk driving factors and portfolio distribution.

Benchmark testing approaches include:

2.2.8.1 Rating reviewers re-rate the results rated by rating persons in the expert judgment-based system;

2.2.8.2 To rate the expert judgment-based exposures using internally developed models;

2.2.8.3 Experts rate the model-rated risk exposures based on their experience; and

2.2.8.4 Comparing the results of internal rating and external rating.

2.2.9 Commercial banks performing benchmark testing on risk parameter quantification can test the four quantification stages as described in Annex 5:

2.2.9.1 Comparing sample dataset and other data sources;

2.2.9.2 Using a different method to calculate risk parameters for the same sample data;

2.2.9.3 Using a different method to map; and

2.2.9.4 Using a different method to adjust data in the implementation stage.

2.2.10 where the internal rating and risk parameter quantification results derived from benchmark testing are different from actually used results, commercial banks shall find out the causes, confirm whether the internal rating results or risk parameter estimates are erroneous, and analyze whether such differences are acceptable.
2.3 Regular continuous monitoring

2.3.1 Commercial banks shall continuously monitor the internal rating system and ensure the internal rating system and risk parameter quantification work as per requirements in this Annex. The regular continuous monitoring includes but not limits to the following:

2.3.1.1 Governance structure surrounding the internal rating system;

2.3.1.2 Operation of rating system, including rating processes and rating override;

2.3.1.3 Implementation and adjustment of rating policy;

2.3.1.4 Accuracy of rating results;

2.3.1.5 Use of ratings;

2.3.1.6 Storage, management, maintenance and quality of data;

2.3.1.7 Stability and predictability of rating indicators or risk variables;

2.3.1.8 Stability of rating models;

2.3.1.9 Distribution and migration of ratings;

2.3.1.10 Changes in the working environment of rating models; and

2.3.1.11 Weaknesses identified in previous validation stage.

2.3.2 Commercial banks shall continuously monitor the models from the first day when the models are launched to the day when the models are removed or the model results are no longer used for the calculation of risk weighted asset.

2.3.3 Commercial banks shall, in light of the features of different assets
and updated obligor/facility performance, determine reasonable monitoring frequency and develop monitoring analysis report. In the event of material market changes, commercial banks shall timely adjust the monitoring frequency.

2.4 Comprehensive post-adoption validation

2.4.1 Commercial banks shall conduct back testing and use statistical methods to analyze internal rating results and risk parameter estimates. They shall document the methods and data used for back testing. Back testing shall be conducted at least once a year.

Back testing compares prediction results of the internal rating system with actual results, and analyzes empirically the accuracy of internal rating determination, pool segmentations and risk parameter estimations.

2.4.2 Commercial banks shall conduct comprehensive post-adoption validation on internal rating quantification models and supporting systems. The validation of quantification models shall at least meet the requirements specified in this Annex on the validation of data, rating models, probability of default (PD), and loss given default (LGD) and exposure at default (EAD). The validation of supporting systems shall at least meet the requirements specified in this Annex on the validation of information system, policy and processes, as well as the requirements specified in Annex 5 on governance structure, data management, document-based management and application of internal ratings. The comprehensive post-adoption validation shall also cover process verification concerning the supporting systems.

2.4.3 Process verification includes a range of activities to assess whether internal rating and risk parameter quantification are operated, monitored and updated as per design requirements. It includes determining the quality of data and reasonableness of rating processes, and shall make sure identified deficiencies are corrected.

2.4.4 As for different internal rating-based approaches and risk parameter quantification methods, commercial banks can use corresponding process verification methods:
2.4.4.1 For commercial banks adopting model-based internal rating system, the process verification shall include evaluating the automatic allocation process, for example, verifying whether computer coding model and data input are correct, and assessing whether the use of models conforms to the requirements specified in Annex 5; and

2.4.4.2 Commercial banks adopting expert judgment-based internal rating system shall ask independent inspectors to assess whether rating staffs follow current rating policy. Minimum validation requirements shall include transparent rating process, information data foundation used by rating staffs, and records of rating decisions.

2.4.5 Commercial banks’ validation policy shall set forth tolerance level relating to internal rating results as well as the difference between risk parameter estimates and actual results, and specify necessary remedies and handling processes when the difference exceeds the tolerance level.

2.5 Data validation

2.5.1 Commercial banks shall validate the data used for the rating system, including validation of sample data for modeling and actual business data used for internal rating.

2.5.2 Commercial banks shall, prior to the comprehensive pre-adoptions validation, validate the integrity, comprehensiveness, accuracy and consistency of data, data quality and treatment of deficiencies.

2.5.2.1 The validation of sample data integrity shall focus on assessing sample size, observation period, and compliance with basic requirements on rating models, and analyzing the impact of the size, time period and frequency of sample data collection on the accuracy of risk parameter estimates;

2.5.2.2 The validation of sample data comprehensiveness shall focus on assessing the impact of sample selection methods and steps on the representativeness of sample data and assessing to what extent sample data can reflect the characteristics of the bank’s credit risk
exposure, credit policies and external business environment;

2.5.2.3 The validation of sample data accuracy shall focus on reviewing whether data inputted into the models is truthful and reliable so as to avoid material deviations in data input. The validation staffs shall review the impact of data cleaning methods on data accuracy and comprehensively verify the labeling of defaulting obligors and facilities. For exposures that accuracy shall be validated with sampling, the representativeness of sampling method shall be analyzed. As for exceptions to input data, it shall be recorded in detail and reviewed.

2.5.2.4 The validation of sample data consistency shall focus on reviewing whether the scopes of automatic data input and supplemented manual data are appropriate and whether the collection criteria are consistent; the banks shall reconcile the data used for the rating system and accounting data so as to assess the level of data consistency;

2.5.2.5 The validation of data quality shall use such methods as consistency across different financial statement, horizontal comparison and trend analysis to analyze and review data quality, and assess the ability of data at specific time points to withstand logic test and the ability of data across multiple time points to withstand business test, statistical test and logic test with regard to continuity and consistency. The validation shall focus on missing values, abnormal values and extreme values identified in the data and the ways to handle those values; and

2.5.2.1 When validating how data deficiencies are handled, commercial banks shall review the model development team’s understanding of sample data deficiencies and its ways to handle such deficiencies, and assess the impact of the ways to handle such deficiencies on the model development.

2.5.3 When using external data to design and validate the internal rating system, commercial banks shall focus on validating the comparability, relevance and consistency between external data and internal data.
Commercial banks shall assess annually whether continuous use of external data is appropriate.

2.6 Validation of rating models

2.6.1 Commercial banks shall verify the compliance and continuous effectiveness of the key definitions for rating models, including the definitions of default, loss, master scale, long-term central default tendency and economic recession.

2.6.1.1 To review whether the definitions and labeling of default and loss meet the requirements specified in Annex 5, and whether the objective criteria and subjective judgment concerning the definition of default are reasonable;

2.6.1.2 To review whether the definition of loss and its actual execution continuously cover direct cost, indirect cost and other specific items, and whether the definition can reflect the time value and is reasonable and operable in business practices;

2.6.1.3 To review whether the definition of master scale, especially the rating levels and criteria, is reasonable and intuitive, whether it can effectively differentiate risks, and whether its description is detailed and operable. The banks shall also review whether the rating levels and criteria for different lines of business, departments and regions are consistent;

2.6.1.4 To review the method to calculate long-term central default tendency and its actual execution truthfully reflect the bank’s historical default experience, whether the most conservative weighting approach is adopted to estimate long-term default tendency, and whether the features of economic cycle are reflected; and

2.6.1.5 To review whether the definition of economic recession is reasonable and operable, whether it can truthfully reflect the features of loss given default during recession, and whether the definition of economic recession relates reasonably to the stress testing scenarios.
2.6.2 Commercial banks shall assess the rationale for and reasonableness of model segmentation and make sure the models can accurately reflect the features of exposures.

2.6.3 Commercial banks shall validate the rating methodologies and assess their internal logic, reasonableness, suitability and limitations of selected models; they shall be able to prove that the selected rating methodologies can accurately reflect the risk features and cyclical features of the objects rated.

Commercial banks shall evaluate the impact of different rating methodologies on the accuracy and stability of risk estimates.

2.6.4 Commercial banks shall assess whether model parameters and basic assumptions are consistent with risk features of asset portfolio and external operating environment, and whether relevant assumptions and parameters continue to be reasonable in the event of changes in economic conditions.

2.6.5 Commercial banks shall review the reasonableness of modeling process, including the logic and basis of sample selection, data cleaning method and process, model parameter selection, single variable analysis, score conversion, multi-variable analysis, and basis for sample and population mapping. The modeling and model optimization process shall be documented separately to ensure the process can be replicated by third parties.

2.6.6 Commercial banks shall validate the model results and pay attention to the relation between the rating results and economic cycle under different rating methodologies.

2.6.6.1 As for obligator rating models and master scale, the validation of results shall include analyzing the reasonableness of long-term average default tendency, assessing the relation between model results and final results of manual intervention, and assessing whether the correspondence between rating levels and probability of default is reasonable;
2.6.6.2 As for facility rating models, the validation of results shall include assessing whether the process for determining facility grade or LGD for different debt categories and the results are reasonable, and assessing the relation between model results and final results of manual intervention; and

2.6.6.3 As for retail exposures, the banks shall check the correspondence between scores and risk parameters, review the reasonableness of actual results and risk parameter estimates, and check whether the logic and structure of pool segmentations are reasonable, whether the results of risk parameter quantification based on segmentation are accurate, and whether asset pools meet the requirements on intra-pool homogeneity and inter-pool heterogeneity.

2.6.7 Commercial banks shall validate re-segmentation of existing customers for home mortgage loans and qualified revolving retail risk exposures every year, and validate the list of SMEs re-segmented to retail risk exposures every year.

2.6.8 Commercial banks shall, in light of actual business data, validate the differentiation capability of the obligator rating models, so as to make sure models can be effectively ranked according to the levels of obligator risks. The differentiation capability shall be tested via at least two methods, including monitoring cumulative accuracy curve and the accuracy ratios of key indicator, ROC curve and AUC coefficient, Somers’D and KS test results, etc.

2.6.9 Commercial banks shall check and document the extent of match between result of model use test and actual business.

2.6.10 Commercial banks shall choose appropriate methods to validate the rating models for low-default asset portfolios. Such methods include:

2.6.10.1 To compare internal ratings and migration matrix with those of third parties, such as ratings and rating changes obtained from rating agencies, common database or other internal models;
2.6.10.2 To compare internal ratings with the judgments by internal and external experts;

2.6.10.3 To analyze the risk features of exposures rated at the same level;

2.6.10.4 To compare the average level of entire asset portfolio with the actual asset portfolio;

2.6.10.5 To review the basis of expert judgment that is incorporated into the rating models and assess the overall performance of models; and

2.6.10.6 To apply self validation, take into full account the impact of data shortfall and make up the shortfall by means of data enhancement.

2.7 Validation of PD

2.7.1 Commercial banks shall validate the PD estimates.

2.7.2 Commercial banks shall, in light of actual default frequency, validate the accuracy of PD estimates. The validation staffs shall use at least two methods to analyze the goodness of fit between actual default frequency and PD estimates, and such methods include binomial test, chi-square test, normality test, traffic light test, Herfindahl Index and conditional information entropy.

2.7.3 Commercial banks shall, in light of actual business data, validate the stability of the obligator rating models, and test whether the PD estimates are stable in the event of changes in the timing and obligor group.

2.7.3.1 Commercial banks shall analyze the impact of different rating methodologies on rating stability and set monitoring indicators for internal stability;

2.7.3.2 Commercial banks shall validate the stability of models’ differentiation capability at different time periods so as to make sure
that the differentiation capability can meet the internally defined stability requirements at least within three years and that the differentiation capability will decline gradually other than suddenly beyond the given time limit as the time period increases; and

2.7.3.3 Commercial banks shall assess the impact of changes in such preconditions as economic and legal environment for the use of models on the stability of PD estimates.

2.7.4 Besides conforming to the provisions in preceding paragraph, the validation of the stability of PD for retail exposures shall include validation of stability of pool segmentation, and assessment of whether the proportions of new customers in different asset pools are consistent with original proportions.

2.7.5 If the PD for retail exposures has considered the seasoning effect, commercial banks shall assess the impact of seasoning effect on the stability of PD estimates, including:

2.7.4.1 Whether the facility seasoning changes;

2.7.4.2 Whether the distribution of facilities aging has witnessed big changes; and

2.7.4.3 Whether PD adjustment parameters for immature retail exposures are appropriate.

2.7.6 Commercial banks shall, in light of actual business data, validate the robustness of obligator PD estimates. The validation of robustness can compare PD estimates with actual default frequency by using statistical methods to make sure the statistical results meet the internally defined criteria.

2.8 Validation of LGD

2.8.1 Commercial banks shall, pursuant to appropriate requirements on the validation of PD, validate the risk differentiation capability, accuracy and stability of LGD estimates.
2.8.2 Commercial banks shall validate how and to what extent economic recession is considered in estimating LGD.

2.8.3 If work-out approach is used to estimate the LGD, the validation shall cover end time of recovery, approaches to assess recoverable amount and cost and selection of discount rate. Commercial banks shall focus on the assessments of:

2.8.3.1 Whether changes in distribution of facilities aging have significant impact on the workout time and amount recovered, and whether the discount rate includes premiums in response to the volatility of recovered cash flow;

2.8.3.2 Whether there is maturity mismatch between the discount rate and recovered cash flow; and

2.8.3.3 Whether direct and indirect costs incurred in the course of workout have been reasonably considered.

2.8.4 Commercial banks shall review whether the LGD estimation procedures are reasonable, i.e. whether the estimation follows the procedures of constructing development datasets, assessing the realized LGD of defaulted facilities, and estimating the LGD of non-defaulted facilities.

2.8.4.1 When validating the development datasets, commercial banks shall assess whether defaulted facilities sample is biased, whether the sample includes annual data that contains many defaults and high realized LGD, whether the risk factors are substantially different from risk factors used for rating or pool segmentations, and whether the definitions are consistent with those used for the probability of default;

2.8.4.2 When calculating actual LGD of defaulted debts, the banks shall assess the impact of economic recession on the LGD; and

2.8.4.3 The estimation of LGD of non-defaulted facilities shall be based on empirical analysis as well as the distribution of realized LGD
of similar defaulted facilities.

First, where models (such as regression model) are used to generate or adjust LGD estimates, the validation shall include assessment of the model’s capability of prediction by means of out-of-sample testing;

Second, where expert judgments are used for adjusting LGD estimates, the validation shall focus on reviewing the adjustment basis and transparency of procedure, and checking the consistency in the implementation of adjustment policy.

2.8.5 Commercial banks can validate the accuracy of LGD estimates through benchmark testing and back-testing. When conducting benchmark testing, commercial banks shall particularly focus on how differences concerning the definitions of default, sample data, and loan recovery, loss and discount rate assessment approaches impact the results of benchmark comparison. They can use external data (e.g. from third party rating agencies) closely consistent with their own asset portfolio as the benchmark. Where external data is not available, they shall be able to provide sufficient reasons and compensatory measures, such as high-frequency back-testing. Where no external benchmark estimates is accessible, for example of retail exposure, the banks can set internal benchmark for testing.

2.8.6 The validation of LGD estimates of retail exposures shall cover the facility homogeneity within the LGD pool, inter-pool heterogeneity, and accuracy of LGD parameter.

2.9 Validation of EAD

2.9.1 Commercial banks shall, according to appropriate requirements on the validating the probability of default, validate the accuracy and stability of EAD estimates.

2.9.2 Commercial banks shall focus on the assessment of estimation procedures when validating the EAD.

2.9.2.1 Commercial banks shall, when assessing the sample data
for EAD estimation, focus on data integrity, including facilities recovered after default occurs;

2.9.2.2 Commercial banks shall review the reasonableness of driving factors for EAD estimation and check whether the following factors have been taken into account: factors affecting the obligors’ funding, factors affecting the bank in providing loans, attitudes of third parties who may become other sources of funding for the obligors, and the nature of particular facilities; and

2.9.2.3 Where expert judgments are used for adjusting EAD estimates, the validation shall focus on reviewing the adjustment basis and transparency of procedure and checking the consistency in the implementation of adjustment policy.

2.9.3 Where commercial banks use a CCF of 100% or the utilization ratio of all facilities for non-derivative instruments among off-balance-sheet items and use outstanding balance for on-balance-sheet items, the validation shall include assessing how conservative the EAD estimates are.

2.10 Validation of information system

2.10.1 Commercial banks shall review whether data in the internal rating information system is comprehensive, complete and effective, whether the data warehouse and risk data mart established conform to the requirements specified herein on the internal rating information system, whether the internal rating information system has been effectively integrated with other information systems, and whether the data coverage is consistent.

2.10.2 Commercial banks shall review whether the internal rating information system can effectively support the rating operation, rating models development, validation and optimization of rating models, internal rating data management and risk reporting, and whether such functions as data collection, data cleaning, storage, back-up, regular uploading of business data, data sampling and data analysis are sound and well-developed;
2.10.3 Commercial banks shall review whether the internal rating information system has gone through functional test, integration test and user confirmation test.

2.10.4 Commercial banks shall review whether the internal rating information system is reliable and secure, whether tests on system security and stability have been conducted, whether appropriate policies and measures concerning data storage and access have been put in place, and whether the backup, recovery and fallback plans and business continuation plan have been put in place to ensure data integrity will not be affected by crisis or disaster events.

2.10.5 Commercial banks shall review whether the internal rating information system is flexible and expandable, and whether it can be improved and upgraded timely where appropriate so as to fully meet the increasing data needs of the internal rating system and model development and operation, and ensure no risk of information loss occurs in the course of information system expansion.

2.11 Validation of policies and processes

2.11.1 Commercial banks shall validate the policies and processes concerning the risk measurement system and ensure the model measurement results can be used reasonably.

2.11.2 Commercial bank shall conduct qualitative validations on the policies and processes. They shall:

2.11.2.1 Validate the compliance of policies and processes, and assess whether relevant policies comply with the requirements specified in Annex 5;

2.11.2.2 Validate the basis and reasonableness of risk measurement policies and processes. The validation of basis covers model characteristics, rating methodologies and rating independence; and the validation of reasonableness covers important factors impacting the quality of model results, such as updating frequency of ratings, professional qualifications of rating staffs;
2.11.2.3 Validate whether policies and processes reasonably define the relation between risk measurement and risk management;

2.11.2.4 Validate the integrity of the definition of default and the timeliness of the maintenance thereof, including the basis and reasonableness of technical default determination;

2.11.2.5 Validate the basis and reasonableness of policies and processes concerning rating initiation, approval, override and updating, review whether the process of implementing rating override policy is mainly based on relevant information not considered by the models and whether the same risk factor is repeatedly considered. Commercial banks shall focus on monitoring rating override, and check whether the norms and processes for monitoring rating override are put in place, and whether judgment criteria for manual rating override produced by model, parameter exclusion or modification of model input are developed; and

2.11.2.6 Validate the reasonableness of rating policy for enterprise group.

2.11.3 Commercial banks shall conduct quantitative validations on the policies and processes. They shall:

2.11.3.1 Use actual data to test the goodness of fit between model measurement results and the results from the rating system, assess the impact of policies and processes on the risk measurement differentiation capability. The validation shall particularly focus on how the integrity maintenance of the definition of default and the handling of technical default impact the differentiation capability and how the rating override policy impacts the differentiation capability;

2.11.3.2 Validate the consistency of policy implementation, assess and calculate the discrepancies between different departments and employees within the bank in understanding and implementing the same policy, and particularly focus on the consistency in the
implementation of expert judgment-based scorecards. The banks shall assess, in conjunction with the results of accuracy and differentiation capability validation, the effect of policies in different regions and at different levels; and

2.11.3.3 Assess the correlation among impact of policies and process, as well as model on risk estimate; in the event of high correlation, the validation shall particularly focus on the reasonableness of policy making and process development.

2.11.4 Commercial banks shall monitor and analyze the rating override. The rating override can be validated from the perspectives of the nature of override, authorized staffs and frequency. The validation shall, in light of the results from risk quantification models, review the impact of override decision and degree of override on the stability of the rating system and analyze the reasonableness of override policy and authorization.

2.11.4.1 The manual override of rating produced by the model and override of initiator’s rating results by rating approvers shall be validated respectively;

2.11.4.2 If ratings are overridden too frequently, commercial banks shall check potential problems with certain aspects of the internal rating system and assess the overrides from the following two angles:

First, to conduct override proportion testing and analyze whether the override proportion is higher than internally defined tolerance;

Second, to test the degree of override and check whether the proportion with the degree of overrides being larger than pre-defined degree of total overrides is higher than pre-defined tolerance.

3. Validation of Internal Models for Market Risk

3.1 Basic Requirements

3.1.1 Commercial banks shall validate the value at risk models for market risk capital measurement and related product pricing models.
3.1.2 Before introducing new models for measurement of the VaR of a new product or business and for market risk capital purpose, commercial banks shall conduct comprehensive pre-adoption validation on the models to ensure the estimates and risk measurement of said product or transaction under the models meet the requirements on internal model approaches.

3.1.3 The comprehensive pre-adoption validation reports shall be used as the basis for commercial banks in approving new products and transactions.

3.1.4 Commercial banks shall continuously monitor, through back testing and other methods, the market risk quantification models adopted, and the monitoring process and results shall be documented so as to ensure an independent third party is able to obtain a full understanding of the continuous monitoring.

3.1.5 Where the number of outliers in back-test results exceeds the threshold value, or other regular monitoring indicators exceed the threshold values, a written report shall be submitted timely to the bank’s senior management in charge of market risk management and comprehensive post-adoption validation shall be initiated where appropriate.

3.1.6 Where the results of a commercial banks’ continuous monitoring suggest the need for overall validation on the internal models or the following changes happen to the internal market risk models, the bank shall validate the capability of the models to reflect the changes in risks:

3.1.6.1 Material changes in the assumptions and measurement approaches of internal models, or in the types of market data and data processing methods used;

3.1.6.2 Significant changes in market structure, or material changes in the bank’s business portfolio that may make internal models unsuitable for actual business portfolio; and
3.1.6.3 New models and functions are added or system is upgraded.

3.1.7 In addition to afore-said circumstances, commercial banks shall conduct an comprehensive validation on internal market risk models at least once every two years, so as to make sure the models can meet the needs of market and business development.

3.1.8 The owner of market risk validation shall perform the following responsibilities:

3.1.8.1 To independently assess the reasonableness of the models’ logic and concept in light of the bank’s actual conditions, assess whether the product entry is correct, and assess the splitting of transaction is reasonable if any transaction is entered in a split manner;

3.1.8.2 To validate the accuracy and stability of pricing models or pricing engines by means of model reproduction, building parallel models or comparing with other benchmark models;

3.1.8.3 To compare the results from parallel models or benchmark models with the results from internal models, analyze the causes of the difference, and put forward validation recommendations accordingly;

3.1.8.4 To prepare model validation documents, submit model validation reports to the senior management, and feedback the validation results to departments responsible for the development, maintenance and use of models; and

3.1.8.5 To analyze the causes of issues and problems identified in the course of model validation, and put forward recommendations for improvement and optimization in light of actual conditions.

3.1.9 The management of documents concerning the market risk validation shall meet the following requirements:

3.1.9.1 Where commercial banks independently develop the models, the model development team shall provide documents
concerning the development process, including model theoretical inference, coding description, programming source code, development process test and validation documents, instructions to users, etc., so as to ensure independent owner of model validation can conduct the model validation based on such documents;

3.1.9.2 Where commercial banks buy models form the third party, the model purchase department shall require the system supplier(s) to provide enough user manuals and technical documentations concerning the models so as to ensure the owner of model validation can conduct the model validation based on such documents; and

3.1.9.3 The owner of model validation shall develop complete and sufficient validation documents, including model theory description, pricing equation inference, data sources, comparison of results from parallel models, etc. The model validation staffs shall assess the effectiveness and limitations of the models and provide a description of the reasons in the validation reports.

3.2 Validation of data input

3.2.1 Commercial banks shall ensure the data input to internal market risk models is accurate, complete and timely. The input data can be divided into transaction and position data, market data, model assumptions and parameters, as well as relevant reference data.

3.2.2 Transaction and position data includes manually input data or data imported from system interface. Commercial banks shall make sure the transmission of transaction and position data in the internal market risk models is smooth, accurate and effective. When establishing the models, commercial banks shall choose a time point for validation and verify new transaction data, position data and transaction data from other sources of that particular day; as for validation of model changes or other types of validation, commercial banks shall validate the input data by means of sampling.

3.2.3 Market data refers to yield curve and exchange rate data provided by external third parties for the purpose of product valuation and VaR
calculation. Commercial banks can choose a time point and conduct cross-validation by comparing the data provided by multiple external organizations; or choose to process raw data by means of independent programming or EXCEL calculation, and then compare with previously processed data, so as to ensure the accuracy of market data.

3.2.4 When using market data about investment portfolios and transaction counterparties obtained through independent collection or calculation, commercial banks shall submit to the CBRC a description of the methods for independent market data collection or calculation, related technical documents as well as illustration of why it is reasonable; Approval from the CBRC for doing so is required.

3.2.5 As for reference data, such as credit ratings of transaction counterparties, commercial banks shall have in place appropriate validation mechanisms, including validation methods, frequency and reporting mechanisms, so as to make sure such data effectively supports the operation of pricing models and internal models.

3.3 Validation of calculation process

3.3.1 Commercial banks shall validate individual product pricing and valuation models in the VaR system, so as to understand the model pricing approaches and prevent losses due to “pricing black box”. Commercial banks shall, in accordance with the model development documents, infer pricing models for various products respectively to assess their respective accuracy and reasonableness; they shall also test by means of independent modeling, parallel calculation or extraction of pricing data published by third parties, so as to ensure the accuracy of models.

The validation of individual product pricing and valuation models can be conducted on the basis of certain number of products or transaction samples by product types and features.

3.3.2 Commercial banks shall validate the VaR generated by the models on the basis of the validation of individual product pricing and valuation models. Commercial banks can select some representative transactions, establish parallel VaR models by product categories, and compare the
outcomes with the VaRs calculated by the internal models. As for commercial banks holding large positions and offering complicated products, because it is very difficult to reproduce the VaR models, they can use theoretical gains/losses-based back testing to compare the VaR calculated by the internal models with the theoretical gains/losses of that particular day. They shall record the back testing results and handle the models pursuant to relevant requirements specified in Annex 11.

3.3.3 Commercial banks using theoretical gains/losses-based back testing to validate the VaR can, in light of the characteristics of their own risks and portfolio structure, take the following validation methods as supplement. The CBRC can require commercial banks to use the following methods as supplement to traditional validation methods.

3.3.3.1 To extend the time horizon for theoretical gains/losses-based back testing, for example conducting back testing on historical data over three years; if there were material changes in the bank’s internal models or market conditions during the selected historical time period, or if the historical data is not applicable, there is no need to use this method;

3.3.3.2 To conduct theoretical gains/losses-based back testing at a confidence level higher than 99%; and
3.3.3.3 To conduct theoretical gains/losses-based back testing on the bank’s sub-portfolios;

3.3.4 Commercial banks shall, in light of their experiences of and needs for routine risk management, pre-define reasonable tolerance level, and compare the differences appearing in the course of validation with the tolerance level. If the differences exceed the tolerance level, the owner of model validation shall, according to the types of issues, timely feedback the issues to the owner of model development, external model supplier or market data provider, and inform the senior management thereof. In the mean time, the owner of model validation shall work with the owner of development, system provider or market data providers to identify the causes of the issues and modify and improve the models, market data or reference data as soon as practical. If the issues are caused by the system provider or market data provider, the bank shall timely report to the
CBRC.

3.4 Validation of market risk reports

Commercial banks shall validate the market risk reports generated by the internal market risk models, so as to ensure accurate dissemination and reasonable use of model results. The market risk report shall include such key elements as an overview of model output, model operation results, important model assumptions and parameters, and limitations of models, and supplementary information such as the results of regular sensitivity analysis and scenario analysis.

4. Validation of advanced measurement system for operational risk

4.1 Basic Requirements

4.1.1 The validation of advanced measurement system for operational risk shall cover key aspects of risk capital measurement, including validation of advanced measurement approaches and relevant supporting systems.

4.1.2 Commercial banks shall conduct comprehensive pre-adoption validation on the advanced quantification models and particularly test the key assumptions, input data, parameter settings, modeling process, and the effect of trial operation, so as to ensure that the conditions exist for the adoption of advanced quantification models.

4.1.3 Commercial banks shall validate the functions of relevant infrastructures impacting system operation and results, so as to ensure these infrastructures support the use of quantification models.

4.1.4 Commercial banks shall continuously monitor the operation of advanced measurement system to ensure the operation meet appropriate policy and process requirements and make timely modifications where appropriate.

4.1.5 Commercial banks shall conduct comprehensive validation on the advanced measurement system at least once every two years, so as
to provide basis for continuous use or optimization of the system. When there are material changes in the operational risk profile, operational risk measurement methodology or assumptions, business environment or internal control elements, commercial banks shall timely initiate the comprehensive validation.

4.1.6 Commercial banks shall, in light of the business nature and size, product complexity, operation of risk management system and (trial) operation of advanced measurement system, choose suitable validation methods. When selecting the validation methods, changes in the market and operation environment shall be taken into consideration. The banks can, in light of their needs, use multiple validation methods, such as benchmark testing, back-testing, stress testing, etc. They shall regularly assess the fitness for purpose of the validation methods.

4.1.7 No matter what validation methods are chosen, commercial banks shall validate the policies, processes, data, model assumptions, parameters and modeling process concerning the advanced measurement system to ensure the accuracy, robustness and sensitivity of the advanced measurement system.

4.1.7.1 Accuracy: to validate how accurate the measurement results reflect actual results;

4.1.7.2 Robustness: to validate how robust the measurement results are; the model confidence level shall be at least 99.9%; and

4.1.7.3 Sensitivity: when there are changes in the business environment and internal elements, the bank shall compare the difference between pre-change and post-change measurement results to determine the sensitivity of the measurement system.

4.1.8 Commercial banks shall adopt appropriate validation indicators for advanced measurement approaches that use different technologies.

4.1.8.1 Commercial banks using scorecard for measurement of operational risk capital shall focus their validation on experts’
subjective judgment, qualitative assessment data, logical relation for mapping, etc.;

4.1.8.2 Commercial banks using internal measurement approach for measurement of operational risk capital shall focus their validation on the accuracy and robustness of risk exposure indicators, loss probability and even loss values; and

4.1.8.3 Commercial banks using loss distribution technique for measurement of operational risk capital shall focus their validation on the cleaning and mixed use of internal and external loss data, distribution function of loss probability and event loss severity, key statistical characteristics of loss distributions for different business lines, including time difference, heterogeneity and correlation, etc; and the weights of internal data, external data, scenario analysis, business environment and internal controls shall be validated.

4.1.9 In addition to afore-said general responsibilities, the internal auditing department shall, in routine examination of business and functional units, focus on the processes for operational risk loss data reporting, and loss monitoring, consolidation and reporting.

4.2 Validation procedures

Commercial banks shall set up procedures for different validation stages to standardize such activities as identification, verification, continuous monitoring of key risk elements, change control, analysis, calibration and approval of results, reporting and self-correction, and documentation.

4.2.1 To define the definitions of all key risk elements for the operational risk management system and operational risk capital measurement system, determine the scope of validation, and prepare a list of key risk elements to be validated.

4.2.2 To choose validation methods, configure sufficient validation resources, develop validation procedure, reasonably arrange the order and frequency of various validation activities, and independently validate different models or key risk elements.
4.2.3 To continuously monitor the whole process of internal validation, and re-validate timely when there are material changes in the business environment and internal control elements or other key risk elements.

4.2.4 When major adjustments are made to the validation due to material changes in the objects validated or validation conditions, the changes in the validation shall be timely recorded and reviewed, and contingency plans shall be developed accordingly so as to ensure the validation will not be hindered by the changes.

4.2.5 To choose appropriate benchmark, in light of the validation results, for calibration of measurement results, so as to ensure measurement results meet pre-defined criteria.

4.2.6 To report the validation results and self-correction recommendations timely to the senior management.

4.3 Validation of Data

4.3.1 Data validation includes validation of internal data, external data, scenario analysis data, and data related to business environment and internal control elements. The validation shall focus on:

4.3.1.1 Internal/external data standardization methods;

4.3.1.2 The processes for the determination of criteria for the use of external data;

4.3.1.3 The standards from which scenario analysis data is generated, how appropriate the level-of-detail for the bank’s data is and how reasonable the scenario data assumptions are; and

4.3.1.4 How appropriate the selection of business environment and internal control elements is and how such elements are integrated into the measurement system.

4.3.2 Commercial banks shall regularly review the loss data submitted by
the business departments or supporting departments. The staffs in charge of business lines or operational risks shall be required to confirm the integrity of reported data and identify deficiencies in the loss reports.

4.3.3 Commercial banks shall ensure that the cyclical sample tests on reported events can be checked in the risk and control self-assessment procedures; where possible, the banks shall make comparisons in the loss database and related sub-systems, and the aforesaid sub-systems shall be capable of monitoring first-hand loss data.

4.3.4 The operational risk event data collection system of commercial banks shall cover loss results, provide support to the investigation of event causes, and support corresponding documentation activities so as to generate traceable records and have the events handled as per appropriate authorization and treated in corresponding general ledger or sub-system.

4.3.5 Commercial banks shall comparatively analyze the loss tendency of different businesses, departments and regions, and ensure the reasonableness, comparability and effectiveness of qualitative assessment by setting appropriate conversion factors.

4.3.6 Commercial banks shall validate the sufficiency and appropriateness of threshold values. When setting threshold values for loss data, the sensitivity of quantification models and effectiveness of management assessment shall be taken into account so as to ensure loss data below threshold values will neither exert material impact on expected loss, unexpected loss and corresponding regulatory capital, nor weaken the effectiveness of the bank’s operational risk management.

4.3.7 The input data for advanced quantification models shall be set reasonably and shall cover key risks; the collection methods shall be consistent and can support business management. The banks shall establish clearly defined criteria for the cleaning of and continuous validation on the input data for advanced quantification models.

4.4 Validation of models

4.4.1 Commercial banks shall make sure the relation between input
parameters and output results of the models is stable, and the concepts, assumptions and parameter settings are reasonable and feasible, including the assumptions contained in the operational risk exposures, data generation models and operational risk capital requirements; they shall also make sure related technologies are transparent and intuitive.

4.4.2 Commercial banks shall review the weights of internal data, external data, scenario analysis data, business environment and internal control factors in the operational risk measurement system and make sure these weights are reasonable.

4.4.3 Commercial banks shall review the selection of distribution functions. No matter whether the functions are produced from historical data or generated by means of simulation, the banks shall ensure the distribution functions are consistent with the distribution of operational risk losses facing the banks currently and in the future period.

4.4.4 Commercial banks shall check how sufficiently the advance quantification models reflect low-frequency, high-loss events, and particularly check how robust and sensitive the results of bank-specific operational risk stress testing are in reflecting low-frequency, high-loss events.

4.4.5 Commercial banks shall check whether the calculation of expected and unexpected operational risk losses is accurate. The logic between expected and unexpected losses shall be intuitive and reasonable.

4.4.6 Commercial banks shall check the coefficient of correlation among variables, ensure the assumptions for the correlation coefficient are reasonable, and make sure the correlation coefficient of historic data or scenario data is consistent with actual circumstances.

4.4.7 Commercial banks shall review the reasonableness of aggregate capital requirements on various business lines. They shall ensure the aggregate capital requirements produced by advanced quantification models on various lines of business have taken into account such factors as different distributions, correlations and time differences.
4.4.8 Commercial banks shall check the models’ output results and analyze the difference between model results and actual results as well as the causes of such differences.

4.5 Validation of policies and processes

4.5.1 The validation of the policies for advanced measurement system shall include but not limit to the following:

4.5.1.1 Whether clear policies for advanced measurement system have been developed and effectively implemented across the bank;

4.5.1.2 Whether the policies have provisions concerning effective corporate governance, measurement processes, measurement approaches and models, measurement results and application, and measurement reports;

4.5.1.3 Whether the policies address the effectiveness of operational risk management framework, and whether they contain procedures for reviewing and updating operational risk management framework and set forth requirements on the compliance of the standards, policies and procedures for operational risk management; and

4.5.1.4 Whether the policies set forth requirements on the consistency of advanced measurement approaches applicable to different lines of business.

4.5.2 The validation of advanced measurement system process shall include but not limit to the following:

4.5.2.1 Whether management processes regarding advanced measurement system have been developed and effectively implemented across the bank;

4.5.2.2 Whether the management processes clearly cover such activities as identification, assessment, monitoring, control, mitigation and reporting;
4.5.2.3 Whether identification activities clearly include assessment on key risk elements, such as business environment and internal control elements; whether the scope of risk measurement is clearly defined; whether the sources of internal/external data and corresponding collection procedure and storage is clearly defined; and whether loss data criteria are developed;

4.5.2.4 Whether assessment activities clearly include assessment on data input criteria, data cleaning, model assumptions and parameters, modeling process and output of results; whether the tests and reviews on adjustments to the estimation of operational risk capital requirements is clearly defined, including operational risk exposure and corresponding assumptions, advanced quantification models and operational risk capital requirement;

4.5.2.5 Whether monitoring activities clearly include defining the scope of operational risks monitored by the operational risk management system; the monitoring shall also include assessing the operational risk management system to check whether all major activities and risk exposures are monitored; reviewing whether the key risk elements, loss data, compliance report and VaR estimates are consistent with the results of self qualitative assessment; and monitoring the performance and robustness of the operational risk management system and checking the statistical relations and assumptions contained in the system.

4.5.2.6 As far as control activities are concerned, whether response plans concerning control criteria and control processes are put in place when there are material changes in the business environment and internal control elements, when there are material adjustments to model assumptions and parameters, or when new product and/or new business is launched.

4.5.2.7 As far as mitigation activities are concerned, whether the bank’s contingency plan contains mitigation measures for addressing residual risks, including suspension of certain businesses, implementation of certain insurance arrangements, and appropriately raising operational risk capital requirement, when there are material
adjustments to model assumptions and parameters, or when new products and/or new businesses are introduced.

4.5.2.8 Whether reporting activities include following clearly-defined written procedures to record the development and operation of quantitative models; whether the documentation is complete; and whether there are clear-cut reporting lines and whether the management information reporting procedures are followed.